CLAIMS

1. A method for providing jitter reduction in a data network that uses a Strict Source route option, including an internet protpcol (IP) destination address for information packets, the data network having ingress Border Routers (Edge Nodes), egress Border Routers and at least one intermediate router, the method comprising the steps of:

- each ingress Border Router (or Edge Node) recognizing data packets with firm jitter requirements and forwarding them to certain fastest and shortest paths based on the IP destination address of each data packet;

-enabling the ingress Border Router (or Edge Node)which classifies a data packet with firm jitter requirements for the IP destination address of which it has no entry, to insert a list of router addresses that identify the selected shortest and fastest path in the Strict Source Routing IP option;

- using all intermediate routers which receive a data packet with the Strict Source Routing IP option for forwarding the packet to a next hop address specified in the IP option, the next hop address remaining in a forwarding cache table of the routers;

- routing all subsequent packets that have the same IP destination address to follow the same path that the first packet has followed, while ensuring that all said subsequent packets will have their strict source route option turned off; and

- periodically updating the selected shortest and fastest path .

2. A method according to Claim 1 including the step wherein the domain administrator will maintain a list with the shortest and the fastest forwarding paths, which will be configured in each Border Router (or Edge Node).

3. A method according to Claim 2 including the step of the administrator of the network domain defining a time period for updating the selected shortest and fastest path.

4. A method according to Claim 1 including the step of an administrator of the network domain choosing a duration of the time period, depending on a size of the forwarding caches in the routers and on the types of applications that the network domain will support.

5. A method according to Claim 3, including the step wherein the ingress Border Router (or Edge Node) extracts the shortest and fastest path to the egress Border Router from said list by means of special filters configures in the ingress Border Router, which perform the best matching on the IP packet destination address.

6. A method according to Claim 5 including the step wherein the ingress Border Router (or Edge Node) inserts the path it selected into the Strict Source Routing IP option only in those data packets for which it has no information in the forwarding cache during said defined time period.

7. A method according to Claim 1 including the step wherein all the intermediate routers receiving a data packet with the Strict Source routing option set will store at next hop into their forwarding cache, an entry, which will be used for the subsequent data packets that will be forwarded based on the matching of the destination IP address with the entry in the forwarding cache by means of said special filters.

8. A method according to Claim 1 wherein said data network comprises a Diffserv Services (Diffserv) domain and wherein the Diffserv domain operates in accordance with any version of the IP (Internet Protocol).

9. A Border Router (or Edge Node) that operates using the method of Claim 1.

10. A Core Router (or Interior Node) that operates using the method of Claim 1.

11. A Differentiated Services (Diffserv) domain operating using the Border Router of Claim 9.

12. A Differentiated Services (Diffserv) domain operating using the Core Router of Claim 10.

13. A method /algorithm for reducing jitter in an Internet Protocol packet transmission in a network which uses a strict source route option, a forwarding cache and internet protocol (IP) destination address for information packets, the network having at least one ingress Border Router and an egress Border Router and an Intermediate Router, said method comprising the steps of:

an ingress Border Router receiving and recognizing information packets with firm jitter requirements;

the ingress Border Router containing and maintaining a list of shortest and fastest forwarding paths to each egress Border Router, said list being stored and managed by a network domain provider;

checking to see if a recognized packet has a forwarding cache entry for its destination address, and if negative, causing the ingress Border Router to use special filters to extract a selected shortest and fastest path to an egress Border Router which best matches the IP packet destination address;

if the ingress Border Router has an entry for its IP destination address, then forwarding all subsequent packets with the same destination address to a next hop address stored in its forwarding cache;

inserting in the Strict Source route option, a list of router addresses that identify said selected shortest and fastest path;

storing in a forwarding cache a next hop IP address for said destination address; and

selectively updating each said selected shortest and fastest path using a time period T_update.

14. A method/algorithm as in claim 13, including the step wherein said domain provider maintains a list of the shortest and fastest forwarding paths which are configured by each Border Router (Edger Node).

15. A method/algorithm as in claim 14, including the step wherein a network domain administrator configures a time period for updating includes updating the selected shortest and fastest forwarding paths within a predetermined time period which ranges from 60 to 180 seconds.

16. A method/algorithm as in claim 15, including the step wherein the network domain administrator chooses the duration of the predetermined time period based on a forwarding cache size in the routers and on types of applications which the network will support.

17. A method as in claim 13, wherein the step of causing the ingress Border Router to insert a list of router addresses comprises using filters configured in the ingress Border Router to obtain a selected shortest and fastest path so as to best match the IP packet destination address.

18. A method as in claim 15, wherein the step of causing the ingress Border Router to insert a list of router addresses is done only for data packets for which there is no information in the forwarding cache for said predetermined time period.

19. A method as in claim 13, comprising the step wherein a plurality of intermediate routers6 will store an entry of a next hop in their forwarding cache which entry will be for subsequent data packets.

20. A method as in claim 13, wherein the network comprises a Differentiated Services (Diffserv) domain.

21. A method as in claim 20, wherein the Diffserv domain operates in accordance with static or dynamic routing of IP packets.

22. A method as in claim 13, including using Expedited Forwarding for data traffic.

23. A method of reducing jitter in an Internet Protocol (IP) packet transmission in a Differentiated Service Architecture (Diffserv) network, said Diffserv using a forwarding cache and IP destination addresses for packets, and an on demand or traffic driven route cache population, the network having at least an ingress border router and an egress border router, comprising the steps of:

actuating an IP forwarding optional parameter using a strict source route option;

receiving a packet which has a specified IP destination address;

checking the forwarding cache if an entry is available for the IP destination address;

if affirmative, sending a received packet to a next hop specified by the forwarding cache entry;

if there is no entry in the forwarding cache, then, checking if a route table entry exists for the specified destination address;

if there is a route table entry, then, storing the route table entry into the forwarding cache, and sending the packet on its way;

if there is no forwarding cache entry for the IP destination address, then selecting and extracting using filters the shortest and fastest path to an egress border router;

inserting in the source route option a list of the router addresses that identify the selected path;

storing in the forwarding cache a next hop IP address for the IP destination address;

sending the received packet via the selected path; and

handling following subsequent packets which follow the received packet and are bound to the same destination address by routing them to follow the received packet with the strict source route option turned off..

24. A method as in claim 23 wherein the Diffserv network includes intermediate routers which receive a further packet with the strict route option , the method including the step of forwarding the further packet to a first router address in the strict source route option list which is the next hop for said further packet.

25. A method of reducing jitter in an Internet Protocol (IP) transmission in a Differentiated Service Architecture (Diffserv) network which handles information packets with expedited forwarding (EF), said network using a forwarding cache, a strict source route option, at least one ingress border router and one egress border router, and a Diffserv domain provider, said method comprising the steps of:

a. recognizing EF packets which have firm jitter requirements;

b. storing and maintaining in the ingress border router using the Diffserv domain provider a list of the shortest and fastest forwarding paths from the ingress border router to each egress border router;

c. ascertaining if a received EF packet has no entry for its IP destination address;

d. and if affirmative, extracting by using special filters configured in the ingress border router, path-information regarding a selected path representing the shortest and fastest path to an egress border router that best matches the IP destination address of the EF packet;

e. inserting in the strict source route option, a list of router addresses which identify the selected path in step (d);

f. storing in said forwarding cache a next hop IP address for the particular IP destination address; and

g. forwarding subsequent IP packets subsequent to said EF packets to said next hop IP address.

26. A method as in claim 25 including defining a time period T_update which is used for updating the selected path of step (d) in claim 25.

27. A method as in 25 including the step of updating steps (e), (f), and (g) with respect to time.

28. A method as in claim 26 wherein T_update is approximately 60 seconds.

29. A method as in claim 28 wherein T_update is used in a Voice Over IP (VoIP) application.

30. A method as in claim 25 wherein T_update is used in a Public Switched Telephony network (PSTN).

31. A method as in claim 30 wherein T_update is in the range of 120 to 180 seconds.

32. A method as in claim 26 including the step of setting up activation of the time period T_update at start up time of an ingress border router.

33. A method as in claim 25, which includes handling subsequent information packets subsequent to recognized packets, the method including routing said subsequent packets as normal Diffserv packets in the same path as a first EF packet, without activating the strict route source option.

34. A computer program for reducing jitter in an Internet Protocol (IP) packet transmission in a Differentiated Service Architecture (Diffserv) network with assured packet forwarding, said Diffserv using a forwarding cache and IP destination addresses for packets, and an on demand or traffic driven route cache population, the network having at least an ingress border router and an egress border router, comprising the steps of:

actuating an IP forwarding optional parameter using a source route option;

receiving a packet which has a specified IP destination address;

checking the forwarding cache if an entry is available for the IP destination address;

if affirmative, sending a received packet to a next hop specified by the forwarding cache entry;

if there is no entry in the forwarding cache, then, checking if a route table entry exists for the specified destination address;

if there is a route table entry, then, storing the route table entry into the forwarding cache, and sending the packet on its way.

35. A computer program for limiting jitter in an Internet Protocol (IP) transmission in a Differentiated Service Architecture (Diffserv) network which handles information packets with expedited forwarding (EF), said network using a forwarding cache,

a strict source route option, at least one ingress border router and one egress border router, and a Diffserv domain provider, said program using a method, comprising the steps of:

a. recognizing EF packets which have firm jitter requirements;

b. storing and maintaining in the ingress Border Router using the Diffserv domain provider, a list of the shortest and fastest forwarding paths from the ingress border router to each egress border router;

c. ascertaining if a received EF packet has no entry for its IP destination address;

d. and if affirmative, extracting using special filters configured in the ingress border router path, information regarding a selected path representing the shortest and fastest path to an egress border router that best matches the IP destination address of the EF packet;

e. inserting in the strict source route option, a list of router addresses which identify the selected path in step (d);

f. storing in the forwarding cache a next hop IP address for the particular IP destination address; and

g. forwarding subsequent IP packets subsequent to said EF packets to said next hop IP address.

36. A memory having a computer program for reducing jitter in an Internet Protocol (IP) packet transmission in a Differentiated Service Architecture (Diffserv) network with assured packet forwarding, said Diffserv using a forwarding cache and IP destination addresses for packets, and an on demand or traffic driven route cache population, the network having at least an ingress Border Router and an egress Border Router, said program using an algorithm, comprising the steps of:

actuating an IP forwarding optional parameter using a source route option;

receiving a packet which has a specified IP destination address;

checking the forwarding cache if an entry is available for the IP destination address;

if affirmative, sending a received packet to a next hop specified by the forwarding cache entry;

if there is no entry in the forwarding cache, then, checking if a route table entry exists for the specified destination address;

if there is a route table entry, then, storing the route table entry into the forwarding cache, and sending the packet on its way;

if there is no forwarding cache entry for the IP destination address, then selecting and extracting using filters the shortest and fastest path to an egress border router;

inserting in the source route option a list of the router addresses that identify the selected path;

storing in the forwarding cache a next hop IP address for the IP destination address;

sending the received packet via the selected path; and

handling following packets which follow the received packet and are bound to the same destination address by routing them to follow the received packet.

37. A memory having a computer program for reducing jitter in an Internet Protocol (IP) transmission in a Differentiated Service Architecture (Diffserv) network which handles information packets with expedited forwarding (EF), said network using a forwarding cache, a strict source route option, at least one ingress Border Router and one egress Border Rrouter, and a Diffserv domain provider, said program using a method, comprising the steps of:

a. recognizing EF packets which have firm jitter requirements;

b. storing and maintaining in the ingress Border Router using the Diffserv domain provider a list of the shortest and fastest forwarding paths from the ingress border router to each egress Border Router;

c. ascertaining if a received EF packet has no entry for its IP destination address, and if affirmative;

d. extracting using special filters configured in the ingress Border Router path-information regarding a selected path representing the shortest and fastest path to an egress Border Router that best matches the IP destination address of the EF packet;

e. inserting in the strict source route option, a list of router addresses which identify the selected path in step (d);

f. storing in the forwarding cache a next hop IP address for the particular IP destination address; and

g. forwarding subsequent IP packets subsequent to said EF packets to said next hop IP address.

38. A Border Router(Edge Node) that operates using the method of claim 35.

39. A Core Router (Interior Node) that operates using the method of Claim35.